Exhibit # 518

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Exhibit

RECOMMENDATIONS TO CANADIAN ARCTIC GAS PIPELINE LIMITED TO MINIMIZE IMPACTS OF THE PROPOSED PIPELINE ON MAMMALS AND MAMMAL HABITAT

Renewable Resources Consulting Services Ltd.

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INTRODUCTION

The purpose of this report is to summarize under one cover the recommendations which have been made to Arctic Gas to minimize the impact of their pipeline project on mammals and mammal habitat along the pipeline route north of the 60th parallel. The recommendations include extractions from published and unpublished reports as well as those suggested verbally and in correspondence. In addition a few new recommendations which are based on the results of very recent studies are included.

Recommendations listed in this report include those pertaining to:

1. pipeline alignment and location of facilities,
2. scheduling of construction activities,
3. procedure and design of pipeline construction, construction of ancillary facilities, and support activities during construction,
4. operation and maintenance of the pipeline, and
5. abandonment of the pipeline.

A. Recommendations on Location of Facilities

1. General

a) With regard to minimization of overall impact on mammals, the Coastal Route was recommended in preference to the Interior Route; the Main Fork of Canning Route was recommended in preference to the Marsh Fork of Canning Route; the Cross-Delta Route was recommended in preference to the West of the Mackenzie Delta Route; and the East Mackenzie Valley Route was recommended in preference to the West Mackenzie Valley Route.

b) Avoid placement of compressor stations and other facilities within one mile of rivers, lakes, or creeks to avoid destruction of riparian habitat and to avoid disturbance of wildlife using this habitat.

c) Eliminate the need for compressor stations in the valley of the Marsh Fork of the Canning River. If it is essential to have one in the valley, it should be at M.P. 125 rather than M.P. 121.

2. Ungulates

a) Wherever feasible the route should avoid calving areas, migration routes, winter range, mineral licks and other areas of concentrations of ungulates delineated in the Biological Report Series.

b) With regard to the Coastal Route and calving areas of the Porcupine herd, the farther north the route, the more calving area will be avoided. Migration routes would also be most effectively avoided by the most northerly alignment.

c) It was recommended that the Coastal Route between the Malcolm and Firth rivers be re-routed north to the coastal plain to more effectively avoid calving animals and animals moving through the area during spring migration in May and post-calving movements in July.

d) With regard to minimization of the overall impact on caribou of the Porcupine herd, the Coastal Route was recommended in preference to the Interior Route.

e) The pipeline alignment and ancillary facilities should avoid the area in the vicinity of Marsh and Carter creeks used occasionally for denning by polar bears.

f) With regard to ungulates within the Mackenzie Valley, impact on caribou of the Bluenose herd would be most effectively minimized by a route west of Travaillant Lake.

g) Caribou in the vicinity of the Mackenzie River from Ft. Good Hope to Ft. Simpson would be most effectively avoided by a route west of the Franklin Mountains, the general western limits of caribou range.

h) South of Ft. Simpson, interaction with caribou would be minimized by a route avoiding the Cameron Hills, Redknife Hills, and Kakisa River drainage.

i) Moose winter range within the Yukon would be more effectively avoided by the Coastal Route than by the Interior Route.

j) Moose winter range within the Mackenzie Valley would be most effectively avoided by a route along the east side of the Mackenzie as opposed to the west side.

k) It was recommended that the Dall sheep population at Mt. Goodenough be avoided. This contributed to the preference for the Cross Delta Route over the original route which bordered the west side of the Mackenzie Delta. If the Cross Delta Route is not used, the alignment should be moved closer to the Delta in the Mt. Goodenough area.

m) The right-of-way and ancillary facilities should be located away from willow stands and Dall sheep mineral licks found within the Canning River valley. These areas are delineated in the Biological Report Series.

n) It is recommended that Compressor Station 1A-02 at M.P. 79.0 not be located south of M.P. 79 because this area of the Canning River valley is an important entrance and exit for wildlife utilizing the valley as a travel or migration route. Ideally, a compressor station in this general area should be located at or near Kavik Camp.

o) Compressor Station 1A-04 at M.P. 148.3 should be relocated as it may interfere with movements of animals between the Canning River drainage and Cane Creek.

p) It is recommended that Compressor Station 1A-05 at M.P. 197.3 be relocated to M.P. 186 to M.P. 188 as it is now located in a area of major caribou movements, some of which are important to the people of Arctic Village.

q) The wharf site at M 08 should be moved approximately five miles south to avoid an area of good moose winter range. The compressor station at this location should be moved south to avoid disturbance of moose movements along Oscar Creek.

r) The compressor station at M 12 should be moved north at least two miles to avoid an area of good moose winter range.

3. Bears

a) Wherever feasible the route should avoid denning areas and areas of high populations of grizzly bears.

b) With regard to the Coastal Route, the farther north the route, the greater the chance of avoidance of grizzly bears. An exception occurs within the areas noted as occasional denning areas of polar bears on the north slope of Alaska.

c) It was recommended that the Interior Route be moved south to avoid a grizzly denning area in the area of King Edward Mountain.

d) With regard to minimization of overall impact on grizzly bears, the Coastal Route was recommended in preference to the Interior Route.

e) With regard to the Cross Delta Route, a minimization of the length of the route on Richards Island is recommended.

f) As Compressor Station CA-02 at M.P. 87.23 is located near Katakturuk River in an area utilized by grizzly bear, it is recommended to move it at least two miles east of the river.

g) The compressor site and borrow site at M 04 should be moved one mile away from the Thunder River to avoid disturbance of a black bear denning area and possible movement route for other wildlife.

h) The wharf site at M 12 should be located to avoid black bear, fox, and wolf dens which occur in this general area.

4. Arctic Fox

a) It was recommended that the Arctic fox denning area in the vicinity of the Firth River be avoided.

b) It is recommended that Compressor Station CA-04 at M.P. 185.7 be relocated one or more miles east of the main Turner River Channel to prevent damage to riparian habitat and good Arctic fox denning area.

5. Beaver and Muskrat

a) Areas of prime habitat for beaver and muskrat should be avoided by the pipeline alignment. Areas include those classified as Class 1 and 2 habitat in the Canadian Wildlife Service's Atlas of Beaver and Muskrat Habitat Maps and those delineated in the Biological Report Series.

b) General engineering constraints require avoidance of lakes and excessively wet areas such as the Old Crow Flats, Mackenzie Delta, and Ramparts Delta. An additional measure to avoid alteration of habitat in these areas would be to avoid the headwaters and sources of streams which drain into these areas.

c) More effective avoidance of beaver and muskrat habitat contributed to the preference for the Coastal Route over the Interior Route, the Cross Delta Route over the West Delta Route, and the East Mackenzie Route over the West Mackenzie Route.

d) Ground transportation in winter should not occur on lakes since this would reduce the insulative capacity of snow and contribute to deeper ice on lakes to the detriment of beaver and muskrat.

6. Beluga Whale

a) Alignment of the pipeline south of Shallow Bay would avoid potential disturbance of calving or post-calving beluga whales.

B. Recommendations on Scheduling of Construction Activities

1. Winter construction (1 October to 1 May) is recommended for the Yukon Coastal Plain to maximize avoidance of interactions with caribou (the majority of which spend the winter south of the Porcupine River), grizzly bears (which are hibernating in dens), moose (the majority of which winter south of the Coastal Plain), and Arctic fox (the majority of which spend the winter on sea ice).

2. All activities on the Interior Route should be limited to the period 1 November to 1 April.

3. If construction activity is allowed during other seasons, the most critical period during which all activities should be curtailed on the Coastal Plain of the Yukon and Alaska is from 20 May to 15 July.

4. Contingency plans should allow for immediate shutdown of all activities if groups of muskoxen or large groups of caribou are encountered.

5. Dall sheep lambing areas along the Canning River and in the vicinity of Mt. Goodenough should be avoided in May and June.

6. Winter construction is recommended on the Cross Delta Route to avoid interaction with grizzly bears.

7. From Parsons Lake to areas where summer construction is feasible, early winter construction (November to January) would avoid interactions with ungulates during the more critical late winter period.

8. In non-permafrost areas, summer construction is recommended to avoid disturbance of concentrations of moose on winter range. This, however, does not avoid the potential for interaction with bears.

9. From Parsons Lake south, construction of compressor stations and activity at wharfs should be confined to the summer period to avoid disturbance of wintering ungulates, particularly moose.

10. Minimum winter activity at wharf sites M 07, M 08, M 09, M 10, and M 11 is recommended to avoid winter concentrations of moose.

C. Recommendations on Procedure and Design

1. General

a) Pre-construction surveys are recommended to identify and mark dens of bears, foxes, and wolves on the right-of-way and in areas which will be disturbed by ancillary facilities. A survey for grizzly bear and fox dens conducted prior to winter construction would be particularly useful on Langley and Richards islands.

b) The distribution and movements of muskoxen, caribou, Dall sheep, and moose in the vicinity of pipeline construction activities should be monitored in order to provide forewarning of imminent interactions with wildlife and to facilitate the implementation of contingency plans to minimize the impact of the interaction.

2. Pipeline Construction

a) Survey

i) A biologist should accompany the final alignment survey party in sensitive areas so that the minor adjustments, which would avoid unnecessary disturbance, might be made on site. A summer survey to determine final alignment would allow for identification and marking of

problem areas such as small deep creeks and slumping stream banks, and mammal dens which would not be visible under snow during the timing of survey and clearing by hand.

b) Clearing and Grubbing

i) The width of clearing on the right-of-way should be kept to the absolute minimum necessary for the operation of construction equipment. Wherever possible existing right-of-ways should be used to minimize additional habitat alterations.

ii) Willow should not be cleared along the Canning River nor in other areas of good moose winter range such as that in the vicinity of Oscar Creek and Ochre River.

iii) Hand clearing is recommended over machine clearing in most northern areas.

iv) Grading should be avoided wherever possible in both continuous and discontinuous permafrost zones because of interference with surface drainage after construction. Where grading is necessary, provision should be made for maintenance of natural drainage patterns.

v) Grubbing should be restricted to the width of the ditch line and areas where grading is absolutely necessary.

c. Trenching and Blasting

i) The time lapse between trenching and backfilling should be kept to a minimum and should not exceed two days during the months of November, March, and April when some ungulates may be migrating. During the remainder of the winter construction period, a maximum time lapse of one week may be acceptable.

ii) The length of open ditch should be kept to a minimum to reduce interference with animal movements. During the months of November, March, and April when some ungulate migration may occur the length of open ditch should be no more than five miles or that which could be filled or fenced off within two days if surveillance indicated that a herd of migrating animals was likely to encounter the line.

iii) In the event that surveillance indicates an imminent interaction between migrating ungulates and the open trench, the trench should be either refilled or fenced off on the advice of a biologist.

iv) Ditch plugs should be spaced at intervals of one-quarter mile to allow for passage of animals and to allow animals which fall into the trench an avenue of escape. In the event that the trench is fenced off to keep animals away

from it, the ditch plugs should not be fenced to allow passage of animals.

v) Blasting should not be conducted in such a manner as to not create disturbance of grizzly bear or polar bear dens.

vi) Blasting should be conducted in such a manner so as not to disturb lambing areas and mineral licks used by Dall sheep at times when sheep are using these areas. The areas are delineated in the Biological Report Series.

d) Stringing

i) The length and duration of strung-out pipe should be subject to the same restrictions as the open trench.

ii) Strung-out pipe should be placed at an angle to allow for passage of mammals between sections of pipe when they are in the immediate vicinity of construction.

3. Construction of Ancillary Facilities

a) Borrow Pits

i) Borrow and quarry sites should be examined prior to selection and development in order to locate and thus avoid damage to dens and key habitats of mammals such as moose winter range,

ii) Borrow operations should not occur on the north slope of the Yukon and Alaska during the period 20 May to 15 July and would preferably occur only during the period from 1 October to 1 May.

iii) Along the Mackenzie Valley, summer (June through September) borrow operations would avoid disturbance of moose on winter range although borrow sites should not be located in areas of restricted moose winter range.

iv) Borrow sites should be restored to minimize erosion and to provide useful wildlife habitat. A restoration plan for each site should be developed in consultation with biologists.

b) Access

i) The length of access and permanent roads should be kept to a minimum to minimize habitat alteration and creation of additional access for hunters and trappers. The pipeline right-of-way should be used as the access road as much as possible.

ii) Routes of roads should be planned in consultation with biologists who are familiar with the distribution of wildlife in the area.

iii) Roads should be routed away from river valleys and away from winter range of ungulates wherever possible.

iv) Clearing and grading should be minimized on temporary roads.

v) Snow fences used to collect snow for winter roads should have openings of 100 feet at one-quarter mile intervals to allow for passage of animals. These fences should be removed prior to the termination of the winter construction season to avoid disruption of ungulate migrations.

c) Airstrips and Heliports

i) Airstrips on the north slope should be fenced to avoid collisions between animals and aircraft.

d) Wharves

i) Wharves should be fenced to exclude wildlife and should utilize a minimum of space.

e) Stockpiles

i) Stockpiles should be located away from key wildlife habitat and should be fenced.

f) Liquid Storage

i) Fuel and other chemicals should be stored away from lakes and streams and should be surrounded by an

impermeable dike and a fence.

g) Compressor Stations

i) All compressor stations should be fenced to exclude wildlife.

ii) Particular attention should be applied to minimizing noise emissions from all compressor stations on the Coastal Route except for the one at Prudhoe Bay.

iii) Maximum noise attenuation should be applied to all compressor stations on the Interior Route except for the one at Prudhoe Bay and the one at M.P. -52.8.

iv) Along the route from Richards Island to the 60th parallel, particular attention should be applied to minimizing noise emissions at the following compressor stations: M-04 at M.P. 177.1, M-08 at M.P. 356.9, M-09 at M.P. 400.2, M-12 at M.P. 534.23, M-13 at M.P. 583.1, M-17 at M.P. 750.8, and M-18 at M.P. 807.6.

4. Support Activities During Construction

a) Solid Waste Disposal

i) Combustible solid wastes should be removed or incinerated daily.

ii) Non-combustible solid wastes should be removed or buried in a land fill in accordance with government regulations. Waste storage areas should be fenced to effectively keep out bears, foxes, wolves, wolverine, and other species of wildlife.

b) Liquid Waste Disposal

i) Liquid wastes and sewage should be disposed of in accordance with government regulations. Untreated wastes should not be allowed to enter lakes or streams.

c) Maintenance of Equipment

i) Fueling and lubrication of machinery should not be done in a location or manner which would allow petroleum products to enter a lake or stream.

d) Transportation of Men, Supplies, and Equipment

i) Aircraft flights over the north slope between the Babbage River in the Yukon and Prudhoe Bay in

e) Off Time Activities of Personnel

i) In order to avoid excessive harvest of limited numbers of mammals, hunting and trapping by construction personnel should be prohibited.

f) Fire Control and Suppression

i) Forest fire control measures and equipment should be maintained at each compressor station and at each construction camp.

D. Recommendations on Operation and Maintenance of Pipeline

1. Brush control on the right-of-way should be minimized to that absolutely required for reconnaissance and fire hazard control.

2. Machinery used for repairs in permafrost areas during summer should be equipped with low pressure tires to prevent damage to vegetation.

3. In the event that mammals use the pipeline berm for burrowing or denning, a program of curtailing such activity by trapping and removing animals until re-vegetation is well established should be considered.

4. Where beaver dens on drainage channels and culverts create problems along access roads, it is recommended that special beaver control culverts be used; if not feasible, the beavers should be trapped and moved to another location.

5. The impact of construction and operation of the pipeline on mammals should be monitored.

6. Aircraft flights associated with operation and maintenance of the pipeline should be subject to the same restrictions as those recommended for the construction period.

7. Waste disposal associated with operation and maintenance of the pipeline should be subject to the same restrictions as those recommended for the construction period.

8. It is recommended that no hunting and trapping be allowed by pipeline personnel in the vicinity of the right-of-way and that no pipeline facility be used as a base of operation for hunting and trapping.

E. Recommendations on Abandonment of the Pipeline

1. All above ground structures should be removed.

2. Erosion control, stabilization of terrain and other maintenance required to ensure that complete rehabilitation of disturbed areas has been achieved should be continued after abandonment.